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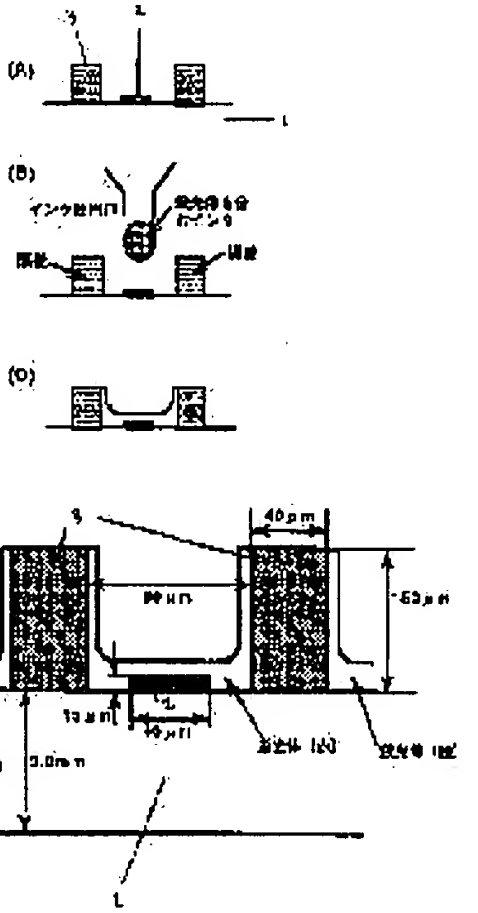
(54) MANUFACTURE OF PLASMA DISPLAY

(57)Abstract:

PURPOSE: To provide a plasma display excellent in fineness by injecting ink containing a phosphor from an ink injecting port of an ink jet head, and drawing a pattern on a glass base plate by a phosphor.

CONSTITUTION: Patterns for an electrode 2 and a bulkhead 3 are formed on a glass plate 1. Three kinds of fluorescent ink are injected into a discharge space surrounded by the bulkhead 3 from an ink jet head into a discharge space surrounded by the bulkhead 3, so that respective colors may be made into a specified arranging state. Finally, heat-burning is performed after drawing by the phosphor is completed. The fluorescent surface of a plasma display having high fineness can be formed.



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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the manufacture approach of a new plasma display. The plasma display concerning the invention in this application is used as a display for a flat TV or information displays.
[0002]
[Description of the Prior Art] Conventionally, screen printing is known as the manufacture approach of a plasma display.
[0003] In the process which forms especially a fluorescent substance, since it can do in low cost simple, many screen printing is used.
[0004] Moreover, although the approach of screen-stenciling after applying the approach of using sandblasting after performing screen-stencil as shown in JP,6-5205,A, and a cross linking agent as shown in JP,5-144375,A is proposed, all use screen-stencil.
[0005] However, screen-stencil had the fault that a pattern with a high precision could not be formed.
[0006] Moreover, although the approach using photolithography as an approach by which a highly precise pattern is obtained is also used, many processes, such as spreading, exposure, development, and desiccation, are needed in this case, and it becomes cost quantity.
[0007]
[Problem(s) to be Solved by the Invention] this invention persons reached the next invention, as a result of considering wholeheartedly the manufacture approach of a plasma display without the above-mentioned fault. It aims at offering the manufacture approach of the plasma display which can form a fluorescent substance with high precision and simple especially.
[0008]
[Means for Solving the Problem] This invention relates to the manufacture approach of the plasma display characterized by drawing the pattern by the fluorescent substance on a substrate by the ink jet method.
[0009] the ink jet method -- potential -- it draws by blowing off a very small ink particle from a controllable head nozzle.
[0010] In this invention, a highly precise fluorescent substance pattern is drawn on a substrate using this method.
[0011] A glass substrate can be used as a substrate. As a glass substrate, although all well-known things including soda glass can be used, PD-200 by Asahi Glass Co., Ltd. with a strain point higher than soda are mentioned as a comparatively good thing. There are a method (DC method) which produces discharge according to a direct current, and a method (AC method) produced by alternating current in a plasma display. That to which both of the methods performed processing for indicating by discharge between two substrates, a tooth back and a front face, is used.
[0012] Generally, in a plasma display, on a substrate, according to the electrode, the septum, and the case, protective coats, such as a dielectric, a resistor, an insulator, and MgO, were formed upwards, and

a fluorescent substance is formed.
[0013] Also in this invention, although the resistor and the dielectric were prepared on the substrate depending on the electrode, the septum, and the case, the pattern of a fluorescent substance can be drawn upwards.
[0014] Furthermore, it is clear that the ink of a class which is different when it blows off stops being able to mix ink easily by using the substrate in which the septum was formed, by this invention.
[0015] Although there is especially no limitation about coloring of a septum, a transparent thing and a black thing are included.
[0016] Moreover, as height of a septum, for 50 microns - 500 microns is suitable.
[0017] Approach ** using the approach using screen printing and photolithography as an approach of forming these electrodes, a septum, a dielectric, a resistor, and a protective coat and sandblasting is used.

[0018] In this invention, the ink to be used contains a fluorescent substance at least. Although all well-known things can be used as a fluorescent substance, it is common to use three kinds, red (R), green (G), and blue (B).
[0019] Specifically, it is Y2 O3 as red. : Eu, Y2 SIO5 : Eu, Y3 AlO12:Eu, Zn3 2 (PO4) : Mn, YBO3 : Eu, (Y, Gd) BO3 : Eu, GdBO3 : Eu, ScBO3 : Eu, LuBO3 : There is Eu etc. and it is Y2 SiO5 as blue. : Ce, CaWO4 :P There are b, BAMgAl14O23:Eu, etc. and it is Zn2 SiO4 as green. : Mn, BaAl12O19:Mn, SrAl13O19:Mn, and CaAl12O19: -- Mn and YBO3 : Tb and BaMgAl14O23: -- Mn and LuBO3 : Tb and GdBO3 : TB and ScBO3 : Tb and Sr6 Si3O3 Cl4 : There is Eu etc.
[0020] When adjusting ink using these fluorescent substances, an organic solvent or water well-known as a diluent or a dispersant can be used, and various polymers, such as polyvinyl alcohol and an alkylation cellulose, can be used as a binder.
[0021] Furthermore, by adding a glass frit preferably in ink in 1 % of the weight - 30% of the weight of the range, an adhesive property with a dielectric side, a substrate (glass) side, and a septum side can be raised, and the plasma display excellent in endurance can be obtained. As a glass frit to be used, the low melting glass whose melting point is 350 degrees C - 600 degrees C is desirable.
[0022] A fluorescent substance side can be formed not only in the base of discharge space but in a side face by adjusting the reducing contact angle over the substrate of ink. When the reducing contact angle over the substrate of ink is made into 70 degrees or less, ink can be applied to the side face of discharge space with the surface tension of ink after the ink jet by the ink jet.
[0023] In this case, the increment in fluorescent substance area can raise luminescence brightness. It is based on the substrate to be used when measuring a reducing contact angle.
[0024] There is the following approach as an approach of carrying out pattern drawing of three sorts of fluorescent substance ink.
[0025] - Perform pattern drawing by repeating performing pattern drawing using the ink jet which spouts the ink containing a monochromatic fluorescent substance.
[0026] - Perform pattern drawing by coincidence or the repeat using two or more ink jets which spout red, green, and three sorts of ink that contains a blue fluorescent substance, respectively.
[0027] Moreover, a long lasting plasma display can be obtained by high brightness by applying heat after pattern formation and removing the organic substance.
[0028] As whenever [stoving temperature], a 300 degrees C - 800 degrees C temperature requirement is desirable.
[0029]
[Example] Drawing 1 is process drawing showing the example of the fluorescent substance side formation approach of the plasma display concerning this invention, and explains this invention to a detail further hereafter according to this drawing.
[0030] First, as shown in (A), the pattern of an electrode 2 and a septum 3 is formed on a glass plate 1. In this example, the obstruction was used as the matrix-like pattern with the pitch of 80 microns, a Rhine width of face [of 40 microns], and a thickness of 150 microns for the electrode 2 as the pitch of 80 microns, Rhine width of face of 40 microns, and thickness of 15 microns.

[0031] Next, three kinds of fluorescent substance ink, R, G, and B, is made to blow off from an ink jet head in the discharge space surrounded by the septum 3 so that each color may be in a predetermined array condition as shown in (B). In this example, the following were used as a fluorescent substance.
[0032] Red (Y, Gd) BO3 : Eu3+ green Zn2 SiO4 : Mn blue What mixed 46 % of the weight of terpineol 40% of the weight as 10 % of the weight of glass frits which consist BaMgAl14O23:Eu2+ these fluorescent substances of low melting glass, and an organic solvent, and mixed 4 % of the weight of ethyl cellulose as a binder was used. The reducing contact angle over the glass of this fluorescent substance ink was 60 degrees.
[0033] Finally, after drawing of a fluorescent substance was completed, (C) and heating baking were performed.
[0034] The temperature up of the temperature was carried out to 450 degrees C after that at 170 degrees C for 1 hour, and after holding at 450 degrees C for 15 minutes, it was cooled radiationally to the room temperature.
[0035] According to the above process, the fluorescent substance side (D) of a high definition plasma display with a cel pitch of 120 microns was able to be formed.
[0036]
[Effect of the Invention] As explained above, the manufacture approach of the plasma display of this invention performs pattern formation simple by using an ink jet for fluorescent substance side formation.

[0037] Thereby, manufacture of a high definition plasma display is attained.
[0038] Moreover, since a fluorescent substance side can be formed also in the side faces (side face of a septum etc.) of discharge space with the surface tension of ink, the activity of sandblasting like [at the time of using screen printing] etc. becomes unnecessary, and can manufacture a plasma display simple.

[Translation done.]